The MAC Flyer

JULY 1980

HAPPY FOURTH OF JULY

The MAC Flyer

MILITARY AIRLIFT COMMAND

GEN ROBERT E. HUYSER Commander in Chief
LT GEN THOMAS M. RYAN, JR. Vice Commander in Chief
BRIG GEN JAMES L. GARDNER, JR. Inspector General
COL LOUIE O. McFERON Director of Safety

THE STAFF

MAJ JAMES G. GIBSON II Supervising Editor
MAJ ALAN D. YORK Associate Editor
CAPT JAMES P. COE Associate Editor
LORENA M. GRAUL, CPS Managing Editor
TOM O'LAUGHLIN Art Director

For Greater Safety and Efficiency in MAC Air Operations.

JULY 1980 MACRP 127-5 VOL XXVII NO. 7

page 10

pages 16 & 17

page 24

The Greatest Sacrifice 3
The Winners 4
Model 14J—The Ultimate Safety System 5
Flight Lines 9
Major Cheburakhin Speaks Out 10
Know Your Charts 12
Mishap with a Moral 14
Roll of Honor 16
Global Notes 18
Helicopter's Mr. In-Between 20
Book Reviews 23
C.R. Terror 24
Quick Stoppers 28

The MAC Flyer is published by the Directorate of Safety, Military Airlift Command, and is authorized until 26 January 1980, unless authorized to continue before that date. The contents are informative and not regulatory or directive. All names of people and places in mishap stories are fictitious; photos of aircraft in mishap stories are representative and not necessarily of the airplane involved. No information in any article may be construed as incriminating under Article 31, UCMJ.

Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225; or call 618-256-3534, or autovon, 638-3534. The editor reserves the right to change manuscripts to improve them or correct technical errors.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Price: $1.30 per copy, $15.00 per year (foreign address: $1.65 per copy, $18.75 per year.) MAC units establish requirements for this magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. Changes of address for subscription mailing should be sent to GPO. Give old and new address, including zip codes.

Distribution F, X; OPR: HQ MAC/IGFE
ISSN 0024—788X

A TMF Editorial

The Greatest Sacrifice

by Major James G. Gibson II
Supervising Editor

While awaiting my turn in the Flight Surgeon's office the other day, I was thumbing through a back issue of a news magazine when I came across an article that dealt with the controversy over the proposed reinstatement of draft registration. One of the illustrations in the article featured a poster-wielding protestor whose slogan was "Nothing Is Worth Dying For!"

Thinking about the attitude exemplified by that poster, I couldn't help contrasting it with a couple of incidents which took place shortly after the valiant, but ill-fated attempt to rescue the American hostages in Iran. The first was a flat contradiction of the poster's message, and it was delivered at the memorial service held in Florida for the eight special rescue team members who perished in the desert aircraft collision. It was that challenging, one-sentence refresher course in humanitarianism from John 15:13, and it was offered by one of the speakers in tribute to the would-be rescuers having made the ultimate sacrifice—"Greater love hath no man than this, that a man would lay down his life for his friends."

The second incident took place during a brief TV interview with one of the injured survivors of the rescue squad, a young airman. He had just stepped off the plane returning him to his wife and child after a brief stay in a military hospital in San Antonio. A newswoman thrust a microphone at him and asked if he would volunteer to go on the same kind of a mission again, given the chance. He paused thoughtfully for just a moment and then in a slow and absolutely resolute drawl, said evenly, "Yes ma'am, I believe I would."

I, for one, am proud to be in the same Air Force with that young man, and I would submit that he and the rest of his special rescue squad members—and all of those in the military and outside it who are willing to put it all on the line in service to their country—are our greatest hope for the future of freedom. It was people with their kind of spirit who felt that an independent United States of America was worth sacrificing and dying for, and thousands more like them down through the years have made it possible for us to enjoy the unique opportunities and way of life we have in America today.

In an age characterized by cynicism and selfishness, it is refreshing to be reminded by a valiant exploit such as the hostage rescue attempt, even when it doesn't succeed in its intended purpose, that we still have brave, unselfish and committed people around. Certainly, there's no better time than during this anniversary month of our nation's birth to pause and give thanks, and rededicate ourselves as Americans and professional military people to what we're really all about.

And if you have any doubts as to what you've signed up for as a member of the Air Force team, just keep in the back of your mind the image of a missing-man formation passing overhead on a warm spring day in Florida. It exemplifies the heritage you share with the countless airmen who have made the ultimate sacrifice in the belief that saving the lives of friends and preserving democracy *are* worth dying for.

For those who have fought for it, life has a greater flavor than the protected will ever know.

--Graffiti on bunker wall,
Khe Sanh, South Vietnam

The Winners

1980 MAC Flying Safety Writing Contest

When the contest closed on 31 March, we had accepted 61 entries—an all-time high according to our records. Successful entrants are now enjoying their colorful C.R. Terror T-shirts and begin getting their complimentary one-year subscription with this issue of the *Flyer.* Stories and poems came from a wide variety of people and places. Entrants ranged from a Civil Air Patrol Cadet to an Air Force Colonel. They included folks from throughout the MAC family, plus people in other MAJCOMs and Military Services and civilians. Entries came from 20 different states, Puerto Rico, Washington D.C., and several foreign countries.

The competition for every winning position was keen and our five judges ended up selecting 12 winners from the Department of the Air Force. Additionally, two stories from non-DAF civilians were of such high quality that they were picked for Honorable Mention in a Special Category.

The top three finishers will receive a walnut desk set attesting to their literary prowess. Honorable Mention winners (DAF only) get a handsome wall plaque. A contest-winning story will appear in each issue of *The MAC Flyer.* This year's first-place winner starts on page five.

First Place

"MODEL 14J—THE ULTIMATE SAFETY SYSTEM"

by Capt Jerry M. Brewton
Det 2, 67 ARRS
Ramstein AB, Germany

Second Place

"NUMERO UNO"

by Lt Col Clarence C. Campbell
1550 FTS / CC
Kirtland AFB, New Mexico

Third Place

"PRIDE GOETH BEFORE . . "

by Capt Michael W. Ryan
14 FTW (ATC)
Columbus AFB, Mississippi

Honorable Mention Winners

Aviation Herpetology
by Lt Col Chuck Hines
Hq MAC DOVA
Scott AFB, Illinois

I Always Leave My Problems at Work . . . I Have Enough at Home
by Capt Thomas P. Hooper
Det 5, 38 ARRS
Tyndall AFB, Florida

Havoc 32, Solo
by Capt Barry H. Smith
Dept of History
USAF Academy, Colorado

"Sounds Good to Me" or The Compromise of Lt Cannon
by Maj Paul C. Robertson
Det 285, AFROTC
Washburn University
Topeka, Kansas

The Beach At Xanadu
by TSgt William R. Madden
702 MAS (Assoc)
McGuire AFB, New Jersey

You Don't Surf Mountain Waves
by Lt Col Garnett C. Brown, Jr.
Regional Negotiations Division
Office of the Joint Chiefs of Staff
Washington, D. C.

The Understatement
by Capt Gary Perkins
Det 18, 38 ARRS
Plattsburg AFB, New York

Lessons Learned
by Capt Gerard D. Hicks
Det 24, 40 ARRS
Fairchild AFB, Washington

The Chicken Coop
by Maj Harold W. Olson
9 MAS
Dover AFB, Delaware

Honorable Mention in Special Category

The Bet
by Randy Padfield
Stavanger, Norway

To Be Remembered
by Doug Wolff
Miami, Florida

First Place, 1980 MAC Flying Safety Writing Contest

MODEL 14J—THE ULTIMATE SAFETY SYSTEM

by Capt Jerry M. Brewton
Det 2, 67 ARRS
Ramstein AB, Germany

Replace men with machines? Ridiculous! I'm not talking about automation—I mean this crazy idea that keeps popping up in sci-fi movies and novels. Androids they're called. Very, very advanced robots. They can bring in the dog, put out the cat and do much, much more. I've seen quite a few of these things on the late, late show and more than once they were cast as crewmembers on some very advanced flying machines. Naturally I took these late night fantasies with a grain of salt—and usually a few shots of Scotch—but the idea of actually developing android aircrews interested me.

Even if it was possible, though, why would anyone want to do such a thing? Maybe the reason was to develop a pilot who never made a mistake. Or a PJ capable of leaping *two* tall buildings in a single bound. It might be nice to have a navigator who never got lost or a loadmaster who could pack a C-5 with loose eggs and never break a one. Or, how about a flight steward with a factory guarantee that it wouldn't spill coffee in the passengers' laps. Perhaps as an economy measure it was important because machines don't require training or salaries. They could also go forever without crew rest or meals and the retention rate should be better than average. These were the thoughts that passed through my mind.

Thinking that maybe there *were* people around who were serious about developing machines to replace aircrews, I decided to do a little research on the subject. I was just curious as to how far science had come in pursuit of these fantasies. Under an assumed name (you think I want my boss to know that I believe in this stuff), I placed an ad in *Aviating Weakly* soliciting information on the development of an android aircrew. Much to my surprise, I quickly received a reply from someone who appeared to be an authority on the subject. His name was Prof. Maxwell Cerebellum, and he sent me some rather impressive credentials. His letter stated that he was degreed in electronics, biology, structural design, and aviation science. He also claimed experience in several Air Force aircraft and said that he was now in the process of developing android aircrews.

I was greeted at his laboratory by his assistant, a ravishing young thing whom he introduced as Miss Burns. Professor Cerebellum himself could have been ordered from a character catalog for B-grade movies: Standard Nutty Professor—frizzy hair, sloppy dress, beady eyes peering over spectacles precariously perched on the end of nose. Unit of issue: one each. Comes com-

plete with a beautiful assistant and a laboratory full of flashing lights and gadgets. Naturally, it was a dark and stormy night when I went to visit him.

I wasted no time in getting to the point. "I'd like to hear about your experiments Professor Cerebellum."

"Please, just call me Max."

"Fine Max. In your letter you said you were developing machines to replace aircrews. Is that correct?"

"Exactly."

"Why?"

"Why? Why not! Man has failed to perform this roll effectively. A machine can do the job better!"

"You think so? How?"

"By performing the duties without the detrimental effects of human weakness. The technological advances of the past few years have made many things possible. A world's champion chess player can be defeated by a cigar box full of wires and microprocessors. You can figure your income tax with a computer no larger than a Zippo lighter. So, why not design machines to fly airplanes? All that's necessary is to gather all the required information, program it into a computer, and then develop a suitable mechanism to carry out the computer's commands."

"Oh," I said, "A robot."

"Robot! Don't use that term! It's too impersonal. Sounds like a kiddie toy! When I design something to replace a human, I make it look human. Call them androids, if you wish, but don't use primitive terms like robot. It brings on visions of square metal heads, pincers for hands, and wheels to roll them from place to place. Does Miss Burns look like a robot?"

Let me assure you that Miss Burns looked nothing like a robot. "No." I observed. "You don't mean she's a . . ."

"Model 38D. Fantastic design, if I do say so myself. Of course, there are other models."

I began to get the feeling that Max was trying to con me, so I decided to make my questions a little more technical. "Tell me how you're going to program your, uh, androids to outperform humans."

"It won't be hard. You see, my statistics show that the average person is only 82.7% reliable." My Androids will be 100% reliable."

"Man has failed to perform this roll effectively. A machine can do the job better!"

"Wait a minute," I protested. "I can't believe that aircrews are only 82.7% reliable."

"I didn't say that! I said that *people in general* are only 82.7% reliable. Aircrews are the product of careful screening. They're 97.1% reliable."

"Well," I agreed, "That sounds pretty good to me. But why not just be a little more selective and raise that to 100%?"

"You think that that hasn't been tried? Screen, select, train, train, train. And still we have accidents! Look at these statistics! Accident! Incident! Incident! Accident! It's been perpetual, but my androids will break that cycle."

"Are you sure?" I asked.

"Sure, I'm sure. Once they're perfected, I'll program them with all the pertinent information—flight rules, aircraft limitations, safety procedures, and especially past accidents! That's man's basic problem, he keeps having the same accidents over and over again! Not so with my androids! They're going to learn from past mistakes."

"Well it does sound good. What else are you planning for the future, professor, besides no accidents?"

"No close calls."

"Close calls?"

"Yes, close calls. Almost accidents. War stories. You know, like the time I pressed on through a line of thunderstorms because I wanted to get home. Or the time I forgot to check the cargo and took off overgrossed. The list is endless."

I understood exactly what Max was saying. I had a few war stories of my own. Still I figured that he had overlooked a few important situations that aircrews must be able to cope with. "What about emergencies?"

"Emergencies? No problem at all. Specific instructions for every system malfunction. Evaluate and react. And take the right action! Never, never let something minor compound itself into a disaster. My machines will never be guilty of saying, 'I thought I could make it.' They'll know their limitations and those of their aircraft. By operating within these limitations they'll be safer than humans—even during emergencies."

"Will this prevent all accidents?"

"Unfortunately it won't prevent all accidents, but it will prevent all accidents caused by human errors—errors in judgment. How many good pilots have permitted perfectly flyable airplanes to stall and crash? How many bad approaches have

ended with accidents rather than go-arounds? Judgment! That's the key. Think you know where you are? Not sure? Go ahead and fly into that mountain! Judgement! Decision height—field in sight? Not sure? Maybe we can duck under this mess—go around! Too late! Judgment! The forecaster was right—this is severe turbulence. Judgment! Judgment!

Max was waving his arms, shouting and starting to foam at the mouth. It occurred to me that instead of a genius,I might well be dealing with a madman. But I couldn't resist offering another challenge. "What about combat?" I asked. "Your letter stated that you flew quite a few tactical combat missions back in the sixties. Don't tell me that you didn't take a few chances when you flew C-130s in and out of Khe Sanh. And those rescue missions in Jolly Greens—you couldn't make a machine capable of flying those. There'll always be a place for humans as long as we have that type of mission to fly."

"Will there?" he countered. "I can program tactical requirements into the androids' memories. I can program combat experiences from a thousand different sources and the safety circuits will still override all others. Combat sorties are increased-risk missions, of course, but somebody shooting at you is an external risk. There's no need to increase the chance of disaster by exposing the aircraft to internal risks—dangers which are caused by crew malfunctions. I understand your skepticism. After all, you're one of the ones who'll eventually be replaced. Please, don't take it personally. I'll have to go too."

"You too?" I puzzled.

"Of course, me too! I'm human. I make the same mistakes that other flyers make. In fact, a lot of the information that I plan to program into the memory banks is from mistakes that I have made. What kind of mistakes do you want to hear about? Inadequate mission planning—I've done it! Poor crew coordination—some real gaggles. How about a little hot-dogging just for fun? Too many times! I'm actually designing a machine to replace me, not you."

I tried to do a quick analysis

Max was waving his arms, shouting and starting to foam at the mouth.

of this man who again was on the verge of hysteria. He's driven by guilt, I concluded. He's made too many mistakes, had too many close calls. Max is truly a madman. Designing machines to replace aircrews—totally absurd. He is living in a fantasy world and thinks that he can convince me to join him. His ideas might be feasible at some time in the distant future, but they are a long way from the present reality. Having decided that he was insane, I chose to humor the professor rather than risk provoking him to violence with more contradictions. "Tell me Max, what sort of medium have you decided to use for these aircrew androids that you're going to build?"

He was calm again. "Well I thought about the 38D like Miss Burns. I'm partial to that model. So versatile. However, I decided against that because it requires electrical recharging. I think I'll use model 14J. It rates high in dexterity and runs on alcohol, C_2H_5OH to be exact. Internal power plant will go forever. Only needs a pint of fuel every 24 hours and it's programmed to refuel itself orally. It's got some minor defects—the knees squeak a little and I didn't include a very good sense of humor in its memory banks. Still, it is highly efficient and will be more than adequate for the test program."

"What do you mean test program?"

"They'll have to be tested extensively. I'm still a couple of years away from having the first prototypes ready. There's so much that has to be programmed in—every flying experience available from the Wright brothers forward. Once they're ready I figure that we'll need five years of discreet testing before we're ready for total force replacement."

"What do you mean by discreet testing?" I asked.

"We'll put them in operational units and compare their performance with their human counterparts. I'm sure that they'll prove superior. And no one will even know that they're around until the tests are complete."

This guy was crazier than I had thought. "Surely they'll be recognized as machines." I observed skeptically.

"Miss Burns," he offered confidently with a sweeping gesture in the attractive android's direction.

I feigned relief again. "Oh," I said, "I forgot. You did say that she's a machine."

Our conversation was interrupted by a loud knock on the

door. Miss Burns opened it and four men wearing white coats trooped in.

"There he is!" one of them said. "I told you he'd be here. He always comes here when he wanders off. Come on Max. It's time to go back to the hotel. We've been worried about you. You really shouldn't leave without telling us."

"Go back? Oh, no. I've got too much work to do here in the lab. Important work. Just ask him," he whimpered, turning to me. "My work's important isn't it?"

Suddenly I felt sorry for Max. "Yes." I said. "Your work is very important, but I think this man knows what's best for you. You'd better go with him."

"You're no different than the rest! You think I'm crazy too! I'm going to recommend that you be one of the first ones replaced when the tests are completed! Just wait, someday you'll see!" he blustered.

He turned to the men who had come for him. "I suppose that we must be going. No one moved the equipment from my room did they?"

"Of course not, Max." One of them answered. "You've still got wires and dummies scattered everywhere—just like you left them. And I think your hamsters need some fresh water."

After they left I turned to Miss Burns, "Did you know?"

"Know what?"

"That the old boy's a little out of trim."

"Say again." She said. "Your terminology appears to be non-standard."

"Oh, I keep forgetting. You're supposed to be a machine. You're probably not programmed for non-standard terminology."

"That is correct."

"You're as crazy as he is," I said, turning to go. Birds of a feather, I thought as her blank stare followed me out the door.

All of this happened several years ago. Since that time I've enlivened quite a few parties by recounting my visit to the mad scientist's laboratory. I must confess that Max did make an impression on me though. He believed in safety and dreamed of a machine that would make aircraft accidents a thing of the past. His intentions were good, but he was following the wrong path in pursuit of his goal. Instead of trying to *replace* people he should have worked to raise their reliability factor toward 100%. Just knowing that I'm only 97.1% reliable has made me more cautious, a little less complacent, and probably a lot safer. Of course I don't have circuits that can be programmed so I won't make another mistake, but I do remember Max's comments. Whenever I'm tempted to push my limits I can hear him screaming, "Judgment! Judgment!" The fact that he promised to see that I was one of the first to be replaced never really worried me. No matter what his intentions, he was, in my opinion, quite mad.

Last week our squadron was visited by an ASET team and they were sharp. Everyone looked like he'd stepped right out of an Air Force recruiting poster, and I've never seen such check rides. I flew with this captain who caught every mistake no matter how small. Things like airspeed—five knots off, altitude—30 feet low, decision height—10 feet too high, ten seconds too long outbound in the holding pattern, and on and on and on. I got an overall satisfactory, but the debriefing made it clear I was a long way from perfect. In fact it left me feeling almost substandard. The session ended with the captain looking at his watch and saying, "Almost seventeen-hundred hours, time to meet the rest of the team at the club for a few rounds of vodka. Care to join us?"

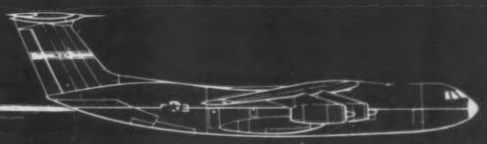
As he stood up to leave I heard it. Barely audible, but I'm sure that it was there. His knees squeaked.

"No thanks." I said. If Max hadn't fixed the squeaking knees he probably hadn't given his androids a sense of humor to appreciate my jokes either. I knew that I'd be under the table a long time before they even finished refueling.

ABOUT THE AUTHOR

A native of Texas, Capt Brewton graduated from the University of Houston in 1970 and completed OTS the same year. After finishing helicopter pilot training in 1971, he was assigned to Thailand flying HH-43s. Next came tours in UH-1Fs and HH-1Hs at Little Rock AFB. In 1976, Capt Brewton took advantage of the Palace Furlough program and worked for a time as an offshore helicopter pilot and an electrician. After returning to active duty in 1976, he was assigned to the Rescue Detachment at Ramstein. Capt Brewton was an Honorable Mention winner in two previous writing contests.

Flight Lines



Unfair Competition

In reading your article, "Accident Statistics for 1979," I noted you omitted AAC, AFLC and AFSC from your DOD Class A Mishap rate graph. These MAJCOMs also help or hurt the overall Air Force Class A mishap rates as "Category I" MAJCOMs. The chart should be labeled accordingly. Including all MAJCOMs in the Class A rate would provide a comprehensive picture of the Air Force Class A rate.

Suggested change in *The Mac Flyer:* SAC, USAFE, . . . TAC publish articles and pictures in their periodicals recognizing individuals for their achievements in the safety area. Suggest you consider a similar article in your magazine.

James R. Faulkner, Lt Col, USAF
Director of Safety
Office of the Inspector General
Alaskan Air Command

★ You're right about the chart, Colonel, it should have been labeled, "DOD Class A Flight Mishap Rates for 1979 for Selected MAJCOMs." Of course, our intent was to show the rates for the MAJCOMs that we have traditionally considered to be our "competition." We certainly didn't intend to decrease the importance of AAC or any other command. By the way, congratulations on Alaskan Air Command's selection for the 1979 Secretary of the Air Force Safety Award (Category II).

As far as aircrew photos go, we try to run as many as we can get our hands on. Since January 1980, the *Flyer* has run 10 photos of MAC people recognizing them for accomplishments, and that's not counting author's photos or the folks shown in "Excellence in Airmanship" on pages 18 and 19 of this magazine. We try hard to include at least as many pictures as there are drawings in our magazine, primarily to avoid a "comic book" appearance similar to some of the other safety magazines you mentioned. We're always in need of new and better photos, and we appreciate it whenever our readers help by sending some in.

Midair Memories Remembered

Your article, "Memories of a Midair," is interesting and especially significant to me. I have a very close association with the accident.

I was stationed at Albrook AFB, Canal Zone, at the time I heard of it. The pilot of the T-39 was a close personal friend whom I had encouraged to join the Air Force. We had spent quite a bit of time together when he was a member of the Air Rescue Squadron at Albrook. In fact, as director of the Tropic Survival School, I had flown rescue missions with him.

On the evening I received word of his death, I called his father and neither of us had any detailed knowledge of the crash. Even after all these years, I am pleased to finally have some details. While the memories evoked by the article are sad ones, I am a long-time advocate of "see and avoid." Hopefully such stories will aid in preventing other midairs.

You will be interested to know that we use *The MAC Flyer* in our office as an authoritative source of information dealing with safety, survival and rescue. Keep up the good work.

H. Morgan Smith
Chief, Environmental
Information Division
Air University Library

I read your article on the midair collision over Clark AB in the March 80 edition and found it most interesting. I also witnessed this sad event. At the time,I was an Airman First Class (E-4) with the 314 TCW and we were TDY to the P.I. from Stewart AFB, TN. Another A1C and myself were walking in the transient alert area when we turned around just in time to see the two aircraft start their final plunge to earth—a sad moment indeed.

One other thing occurred that caused the incident to be engraved in my mind. I believe the crew chief of the C-47 was an A1C Manning from Ohio. Same name, rank and home state as myself.

When I reported for work the next day, several of the shop personnel were startled to see me. My best friend was TDY and when he heard the news of the accident he broke down and cried.

I am now an Air Reserve Technician. All these years I never knew the cause of the accident. In my nine years of active duty I saw several other accidents, but this one always stood out in my memory.

John E. Manning, TSgt USAFR
Lockbourne, Ohio

★ We are glad to see that *TMF*'s mishap stories are being widely read and we trust that their morals will make a vivid impression on folks who haven't had the "privilege" of witnessing or being involved in a tragic crash themselves.

Major Cheburakhin Speaks Out

Originally published in Russian under the title, "A Flight With Obstacles," this rather literal translation describes the travails of a Soviet transport pilot as he encounters various problems that make his job more difficult, including crew transport, billeting and unsympathetic local officials. He also cites airfields where transient service was first rate—sort of a Russian style Rex Riley award. All of this should have a familiar ring to MAC crewmembers.—Ed.

The dispatcher reported that weather conditions on the route were worsening and the takeoff was being postponed for a few hours. Where was the crew of our military transport to while away this time? Naturally it would be better to go to the quarters, but they were located several kilometers from the control tower. On the instructions of Lieutenant Colonel M. Petrov, the Commander of the airport technical maintenance battalion, a tractor covered with a tarpaulin was placed at the disposal of the crew. It could be dispatched for the journey to the quarters, but for the present, it was transporting specialists between aircraft parking stands. The possibility of a good rest before the long flight, therefore, had to be relinquished. But why had the flyers been given a tractor and not a bus? It turns out they [the buses] were being used in hauling linens to the laundry and making other administrative runs. So flight crews, as always, were to go by tractor—which wasn't available at the moment either. Apparently there are not sufficient buses, but Officer M. Petrov, who can't help but realize that the quality of the accomplishment of a task depends upon preflight rest and the mood of the crew,is at least tactful about it.

In my flight book is recorded 5,500 hours of flight time. It has been necessary to land at many air bases in different military districts. And, it must be admitted, often not even a tractor was offered to me, which makes things even more difficult. On a tractor, you know at least it *is* possible to go to the command post and back in order to decide questions connected with permission for takeoff. But, it happens that in general they assign nothing to transport the crew. It is then necessary to go by preflight control, then the doctor, engineer, chief of communications, navigator, and meteorology on foot. Sometimes these services are located a significant distance from each other. It is often necessary to cross the airfield from one end to the other in heat and in cold. After such a marathon, the crewmembers arrive at the aircraft tired.

It is so much more pleasant to remember our stay at the airfield where the organization for meeting the crews is commanded by Lieutenant Colonel A. Kryuk. As

soon as we taxied to the parking area, a bus and other special service vehicles approached the aircraft. The considerate meeting raised our morale and took away the feeling of tiredness after a strenuous flight. It is not surprising that in a short period of time we were ready to continue the flight anew.

Frequently at airfields, uploading must take one or two days. When, for example, night catches us at one of the airfields of the Group of Soviet Forces, Germany, we know that all has been prepared for a rest. Here we can take a hot shower, read current newspapers, watch television, and listen to the radio. The next morning the crew leaves on the flight really rested, full of energy, and in a cheerful mood.

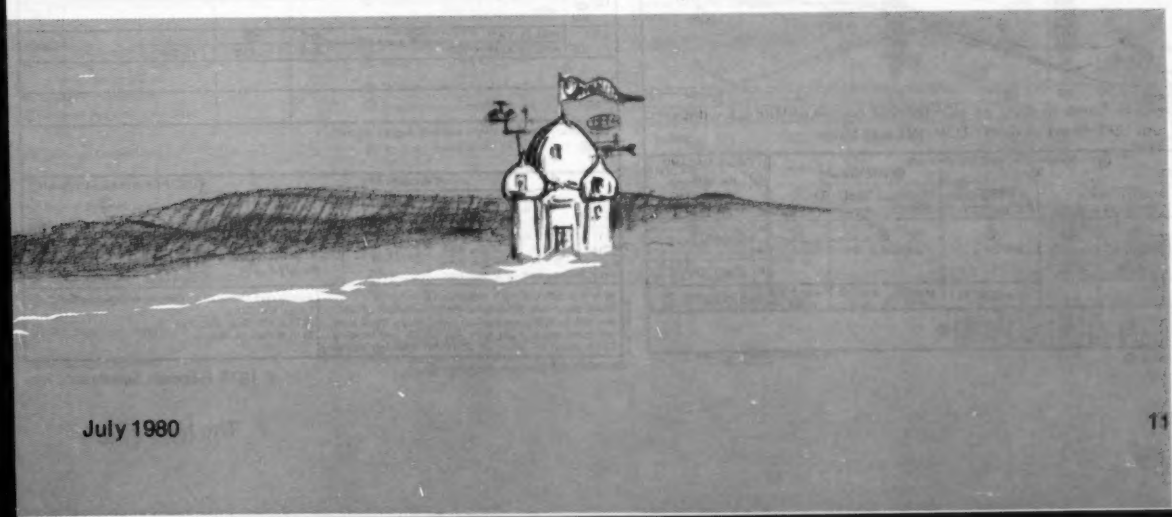
But a night spent by our crew at an airfield in the Turkestan Military District is remembered differently. They accommodated us haphazardly about the barracks. We had just fallen asleep (we arrived after midnight) when the formation bell sounded. It was necessary to get up along with the company personnel. It was not possible to rest more.

The question of whether that night was exceptional—I would not get tired answering. But a similar system of accommodations here and there became the rule, although at all airfields there are supposed to be special rooms for the flightcrews. But most often, non-flightcrew personnel are living in them. Thus, it is necessary to ask the chief of the commandant's office for a place for the crew at night. But he makes a helpless gesture and advises us to find a place in a hotel in the nearest populated place; perhaps they will provide shelter. Once there, one often hears: "There is no place." Nothing is left, so you must while away the time till morning wherever you are.

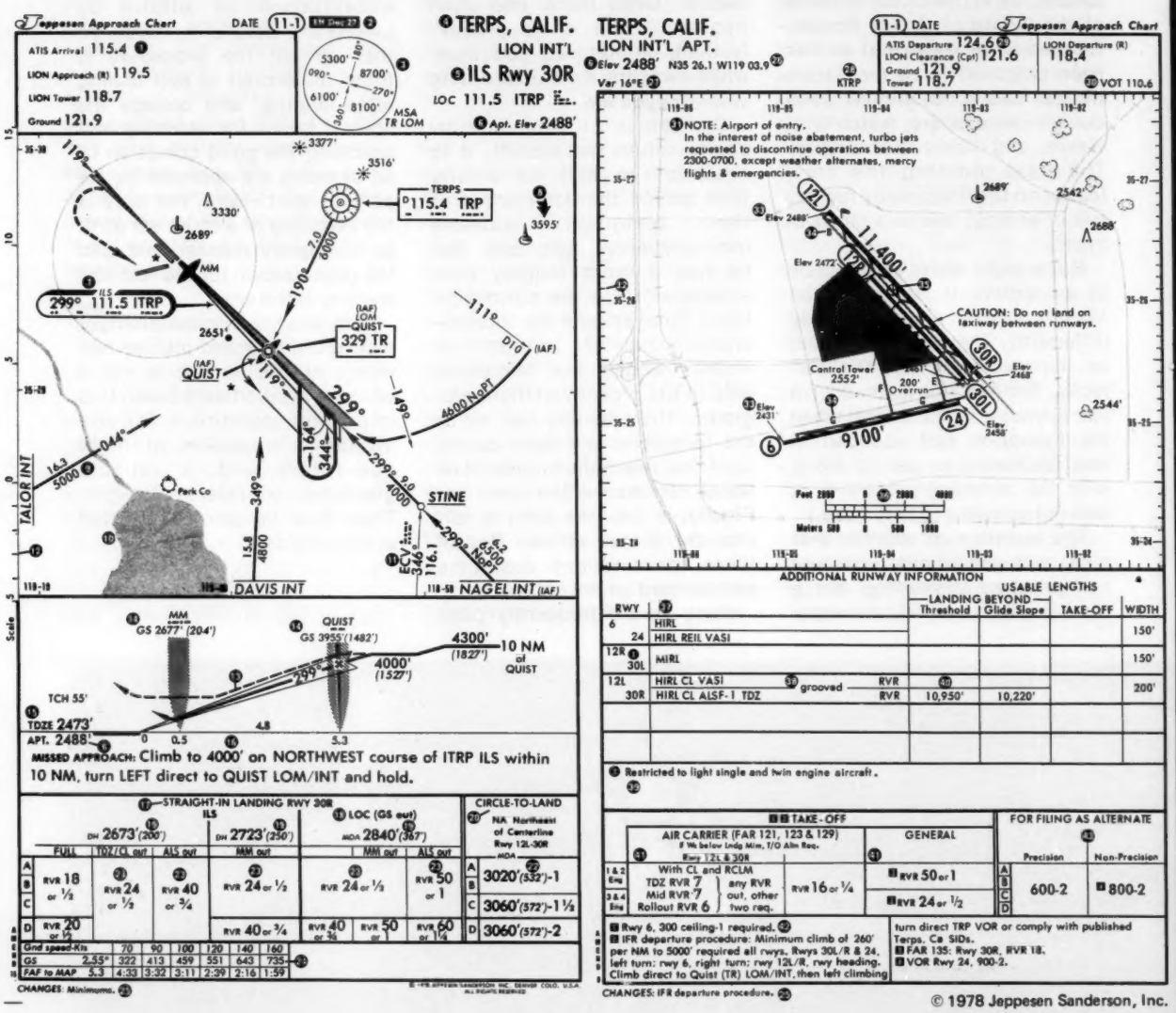
Sometimes it's like this: in order to refuel the aircraft, it is necessary to walk for a long time behind the commander of the technical subunit (podrazdeleniye) and beg. But he has a more weighty consideration: "You are not *our* pilots." To overcome the "bureaucratic" barrier, sometimes neither request nor references help in the urgency of flight programs. The only way out: sit by the telephone and keep calling until you reach the highest level which can resolve the question. Finally, at last, the order to service the aircraft arrives. But all these conversations cost time and are hard on the nerves.

Many hours frequently pass between the landing of an aircraft and the arrival of the fuel supply even at airfields where, in the servicing of an arriving aircraft, an appropriate order is received ahead of time. From my viewpoint, there is no way to explain such a situation other than the poor discipline and lack of administrative abilities of the commander of the supply subunit. Once again I would like to cite as an example the efficient organization of affairs by Lieutenant Colonel A. Kryuk. At that airfield the procedure is thus: an aircraft is still taxiing after landing, and already the special trucks for servicing and checking the good condition of all systems are approaching its parking spot. Here, not only is the servicing of aircraft set up in an exemplary manner, but also the organization for the rest and feeding of the crew.

And you know, good preflight rest and timely and precise servicing of the aircraft is not a whim of aviation personnel. It is important condition for the qualitative execution of flight operations and a reliable guarantee of safety of flight. They must be strictly observed at all airfields.



Know Your Charts


Jeppesen Approach Chart
DATE 11-1
TERPS, CALIF.
LION INT'L
ILS Rwy 30R
LOC 111.5 ITRP
Apt. Elev 2488'
ATIS Arrival 115.4
LION Approach (R) 119.5
LION Tower 118.7
Ground 121.9
TERPS 115.4 TRP
299° 111.5 ITRP
(IAF) QUIST 329 TR
(IAF) QUIST
(IAF) LION
DAVIS INT
NAGEL INT (IAF)
TALOR INT
STINE
Park Co
MSA
TR LOM
MISSED APPROACH: Climb to 4000' on NORTHWEST course of ITRP ILS within 10 NM, turn LEFT direct to QUIST LOM/INT and hold.
STRAIGHT-IN LANDING RWY 30R
ILS
LOC (GS out)
CIRCLE-TO-LAND
NA Northeast of Centerline Rwy 12L-30R
CHANGES: Minimums.
TERPS, CALIF.
LION INT'L APT.
Elev 2488'
Var 16°E
ATIS Departure 124.6
LION Clearance (Cpt) 121.6
Ground 121.9
Tower 118.7
LION Departure (R) 118.4
VOT 110.6
NOTE: Airport of entry. In the interest of noise abatement, turbo jets requested to discontinue operations between 2300-0700, except weather alternates, mercy flights & emergencies.
11,400'
9100'
CAUTION: Do not land on taxiway between runways.
Control Tower
ADDITIONAL RUNWAY INFORMATION
USABLE LENGTHS
LANDING BEYOND
Threshold
Glide Slope
TAKE-OFF
WIDTH
TAKE - OFF
AIR CARRIER (FAR 121, 123 & 129)
GENERAL
FOR FILING AS ALTERNATE
Precision
Non-Precision
Restricted to light single and twin engine aircraft.
Rwy 6, 300 ceiling-1 required.
IFR departure procedure: Minimum climb of 260' per NM to 5000' required all rwys. Rwys 30L/R & 24, left turn; rwy 6, right turn; rwy 12L/R, rwy heading. Climb direct to Quist (TR) LOM/INT, then left climbing turn direct TRP VOR or comply with published Terps. Ca SIDs.
FAR 135: Rwy 30R, RVR 18.
VOR Rwy 24, 900-2.
CHANGES: IFR departure procedure.
© 1978 Jeppesen Sanderson, Inc.

MAC crews are occasionally called on to fly into airfields that aren't covered by DOD Flight Information Publications. In these cases, they usually use approach and airport charts published by Jeppeson Sanderson, Inc. Some contingency operations may require crews to use locally reproduced copies of approach plates without the full advantage of a legend to tell what all the symbols mean. Fortunately there are more similarities than differences between the two types of charts, but interpretation of the information presented can be a problem for those used to DOD approach plates. The comparison presented here was prepared by Jeppeson using a CONUS airport, and is offered in the interest of flight safety. The maps have been reduced slightly for magazine reproduction and are not current for navigation purposes. All Jeppesen material is copyrighted, and the Flyer staff appreciates their granting us permission to "borrow" this material.—Ed.

APPROACH CHART

JEPPESEN

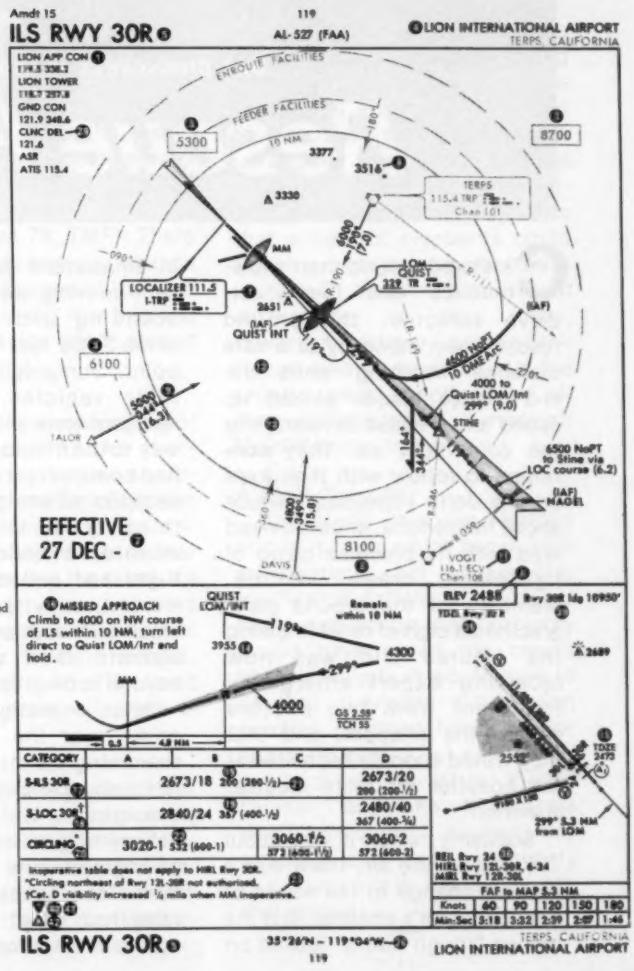
1. Frequencies for arrival in order of use
2. Effective date
3. Minimum sector altitudes (MSA)
4. Charts indexed alphabetically by city name within state (or airline manual)
5. Approach procedure identification
6. Airport elevation
7. Primary approach facility
8. Highest obstruction in plan view shown with arrow
9. Terminal route
10. Water bodies
11. Morse code for forming facilities
12. Plan view drawn to scale
13. Nonprecision profile
14. Glide slope altitudes
15. Touchdown zone elevation (TDZE)
16. Missed approach procedure
17. Straight-in landing minimums
18. Localizer minimums
19. Height above touchdown (HAT)
20. Circle-to-land minimums
21. Not all military minimums shown
22. Height above airport (HAA)
23. Complete component-out minimums
24. Descent rate in feet per minute
25. Changes from previous chart

1. Frequencies for arrival
2. Effective date when different than the bound book effective date
3. Minimum sector altitudes (MSA)
4. Charts indexed alphabetically by airport name within bound book
5. Approach procedure identification
6. Airport elevation
7. Primary approach facility
8. Highest obstruction in 10 NM ring shown by largest type
9. Terminal route
10. Water bodies shown within 10 NM
11. Morse code not always shown
12. Drawn to scale within 10 NM
13. Nonprecision profile not shown
14. Glide slope altitude
15. Touchdown zone elevation (TDZE)
16. Missed approach procedure
17. Straight-in landing minimums
18. Localizer minimums
19. Height above touchdown (HAT)
20. Circling minimums
21. Minimums for some military operations
22. Height above airport (HAA)
23. Component-out minimum for CAT D Other components-out minimums shown on separate sheet
24. Descent rate shown on separate sheet
25. Changes not shown

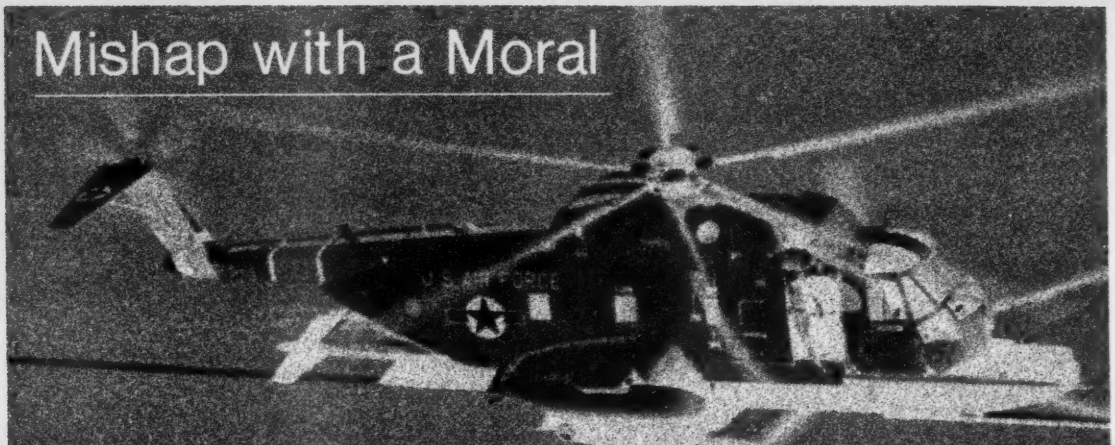
AIRPORT CHART

26. Coordinates for airport reference point (ARP) in avionics format
27. Airport variation
28. Airport identifier
29. Frequencies for departure in order of use
30. VOT frequency
31. Notes (including noise abatement procedures) for airport
32. Latitude/longitude grid
33. Runway threshold elevations
34. Taxiway designators
35. Airport reference point (ARP)
36. Airport diagram scale
37. Runway lighting
38. Runway grooving
39. Runway restrictions
40. Distance beyond displaced threshold
41. Takeoff minimums
42. IFR departure procedures
43. Alternate minimums

26. Coordinates for airport reference point (ARP)
27. Variation shown on taxi chart when included
28. Airport identifier not shown
29. Clearance delivery frequency shown Departure ATIS and departure control not shown
30. VOT frequency not shown
31. Notes for airports not shown
32. Latitude/longitude grid not shown
33. Runway threshold elevations not shown Runway gradient shown when greater than 0.3%
34. Taxiway designators on taxi chart when included
35. ARP not shown
36. Airport diagram scale not shown
37. Runway lighting
38. Runway grooving not shown
39. Runway restrictions not shown
40. Distance beyond displaced threshold
41. Takeoff minimums shown on separate sheet when not standard
42. IFR departure procedures shown on separate sheet when available
43. Alternate minimums shown on separate sheet when not standard



Mishap with a Moral



One crosscheck is worth a million regrets.

Rescue Reversal

Clustered around their snowmobiles and four-wheel-drive vehicles, the ground rescue team stood by at a safe distance watching while the H-3's rotor blades picked up speed and it eased skyward into the cold night air. They continued to follow with their eyes as the Jolly increased altitude above the remote, snow-covered area with its precious cargo of lightplane crash victims. Members of the ground party breathed a sigh of relief knowing the injured trio was now receiving expert emergency treatment from two doctors aboard the chopper, and that they would soon be deposited at the hospital for more medical attention.

Suddenly, when it was about 200 feet in the air, there was a distinct change in the sound of the helicopter's engines, and the rescue "rough riders" looked on in amazement and horror as it kept moving away, began descending and then crashed some 2,000 feet from its takeoff point. Jumping onto and into their vehicles, the ground rescuers were able to make their way to the hillside where the H-3 had come to rest on its side, and assisted all ten people onboard to safety. In less than half a minute, a helicopter rescue flight had turned into a nightmare. Luckily, everyone in the crash survived, even though the aircraft itself was damaged beyone economical repair.

When investigators finished going over the wreckage and examining the mishap from start to finish, some interesting facts emerged. It seems the helicopter's downfall began with an engine failure which resulted from ice ingestion. A heater valve had failed and permitted an excessive frosty buildup on the turbine's inlet area. It also seems that the engine's loss of power was a gradual, insidious sort of failure that went unnoticed by the aircrew, even though audible evidence that something was wrong was heard by observers on the ground. The first solid indication the pilots had that they were in trouble was a windshield full of snow-covered terra firma coming at them seconds before the impact. To try and find out how one of the H-3's engines could fail without attracting the crew's attention, and how an aircraft capable of continued flight on the remaining power plant could be permitted to descend and crash requires some thoughtful examination and analysis.

Takeoff Sequence from the Cockpit

The AC and his crew had already completed a sortie to the

light plane's crash site earlier in the day after being diverted from a training mission, and had evacuated one of the victims to a nearby hospital. While there, they had refueled and picked up a pair of doctors to assist in bringing out the pilot and two other seriously injured passengers. Owing to the fact that it was now pitch black out, the rescue pilot opted for an instrument takeoff (ITO).

Other than intermittent snow showers, generally foul weather and terrain clearance, the pilot's main concern prior to departure on the ill-fated sorties was a slightly aft center of gravity (CG) resulting from the two litter patients and the doctors being located near the H-3's rear ramp and door. He briefed the ITO, asking the flight engineer to take care of the CG adjustment as soon as possible after liftoff, and tasked the copilot to monitor terrain clearance visually and with the radar altimeter. Everything started off according to plan. Soon after clearing the ground, the pilot felt the engineer shift the CG forward and compensated with aft cyclic movement as he proceeded with the ITO. Airspeed appeared to be increasing satisfactorilly as he banked to the left, and the copilot continued to call out increasingly reassuring height readings from the radar altimeter while he scanned outside and then started to set up the radios for an OPCON report. Suddenly, and without any apparent warning, the helo's outside lights seemed to brighten as they reflected off the snow. The struggling bird plowed into the ground and skidded along for several hundred feet, tearing itself apart on the rock-strewn terrain.

Several Questions Arise

• *How could the radar altimeter have been indicating safe clearance above the ground when the H-3 was losing altitude?* The answer rests with a couple of inherent weaknesses in the instrument. First, it is subject to erroneous readings over snow and ice. Second, it can indicate considerably higher than the aircraft's actual altitude when it is measuring slant-range distance. Since it measures altitude by shooting an electronic beam out perpendicular to the craft's horizontal axis, if a plane is banking and flying over terrain that is dropping away, more distance may be displayed than actually exists directly beneath it (see "Radar Altimetry," Dec 79, *TMF*). There is a better-than-average chance that's what happened in this case, since the H-3 was banking left over a hillside which sloped away to the right.

• *Why didn't somebody spot the engine failure?* As mentioned already, it was an insidious type of malfunction—no bangs or unusual vibrations—probably just a compressor stall from the ingested ice and an unobtrusive spooling down of the turbine. The normal noise of an H-3 in flight, especially during an ITO, could have helped mask this type of failure.

• *What about the gages?* Here, one of the real aircrew-eating gremlins rears it ugly head. You might call it misdirected priorities. The AC was concentrating primarily on his flight instruments, since he was flying an ITO at night into questionable weather. The flight mechanic, who would normally have been monitoring the engine instruments closely, was busy correcting the CG problem, and the copilot was involved with a variety of tasks—including scanning outside—that kept him from carefully scrutinizing any instruments other than his radar altimeter. You could also say these crewmembers were suffering from a combination of task saturation, tunnel vision, and lack of crew coordination. Had the engine announced more emphatically that it was going into crew rest, or had no failure occured at all, the crew would have probably been able to chalk up another three saves, and the fact that they were so preoccupied with stomping ants that a herd of elephants could sneak up and trample them wouldn't have made much difference. In this case, however, where an engine failure and a descent into the ground went unnoticed by all three crewmembers, it made all the difference in the world.

A Final Thought

Admittedly, this was a sneaky sort of mishap which began with an insidious, but manageable, mechanical failure. If you could name one action that probably would have saved the crew's bacon, though, it would have to be that timeworn but proven practice of crosschecking. Our airplanes have a lot of ways to try and tell us when they're "hurtin," but none of them are worth two cents if we don't pay attention and react with timely and appropriate measures. It's that simple!

ROLL O

MAC UNIT ACCIDENT-FREE FLYING-HOUR MILESTONE AWARD

650,000 HOURS
76 MAS

500,000 HOURS
14 MAS

440,000 HOURS
75 MAS

400,000 HOURS
3 MAS
6 MAS
41 MAS

350,000 HOURS
4 MAS

300,000 HOURS
1 MAS
58 MAS
86 MAS

250,000 HOURS
57 MAS
62 MAW
375 AAW

200,000 HOURS
53 MAS

160,000 HOURS
9 MAS

150,000 HOURS
136 TAW (ANG)
446 MAW (Assoc)

100,000 HOURS
36 TAS
54 WRS
55 WRS
183 TAS (ANG)
327 TAS (AFRES)
403 RWRW (AFRES)
440 TAW (AFRES)
445 MAW (Assoc)
1400 MAS
1401 MAS
1402 MAS

Flyer

OF HONOR

MAC UNIT ACCIDENT-FREE FLYING YEAR MILESTONE AWARD

AS OF 31 DECEMBER 1979

30 YEARS OR MORE

1 MAS
64 TAS (AFRES)

25 THROUGH 29 YEARS

76 MAS
303 TAS (AFRES)
704 TAS (AFRES)
327 TAS (AFRES)
355 TAS (AFRES)

20 THROUGH 24 YEARS

1 HS
3 MAS
6 MAS
14 MAS
57 MAS
96 TAS (AFRES)
156 TAS (ANG)
167 TAS (ANG)
180 TAS (ANG)
183 TAS (ANG)
301 ARRS (AFRES)
303 ARRS (AFRES)
305 ARRS (AFRES)
312 MAS (Assoc)
313 MAS (Assoc)
731 TAS (AFRES)

10 THROUGH 19 YEARS

4 MAS
36 TAS
41 MAS
Det 1, 38 ARRS
Det 5, 38 ARRS
Det 10, 38 ARRS
Det 11, 38 ARRS
Det 15, 38 ARRS
Det 18, 38 ARRS
Det 5, 40 ARRS
Det 22, 40 ARRS
53 MAS
53 WRS
54 WRS
55 ARRS
55 WRS
58 MAS
63 TAS (AFRES)
Det 9, 67 ARRS
68 TAS (AFRES)
71 ARRS
73 AAS (Assoc)
75 MAS
86 MAS
94 TAW (AFRES)
95 TAS (AFRES)
97 MAS (Assoc)
105 TAS (ANG)
130 TAS (ANG)
135 TAS (ANG)
136 TAW (ANG)
137 TAW (ANG)
142 TAS (ANG)
143 TAS (ANG)
144 TAS (ANG)
164 TAS (ANG)
181 TAS (ANG)
185 TAS (ANG)
300 MAS (Assoc)
301 MAS (Assoc)
302 TAW (AFRES)
315 MAW (Assoc)
326 MAS (Assoc)
328 TAS (AFRES)
335 MAS (Assoc)
337 TAS (AFRES)
356 TAS (AFRES)
403 RWRW (AFRES)
440 TAW (AFRES)
445 MAW (Assoc)
446 MAW (Assoc)
459 TAW (AFRES)
700 TAS (AFRES)
728 MAS (Assoc)
729 MAS (Assoc)
730 MAS (Assoc)
732 MAS (Assoc)
756 TAS (AFRES)
758 TAS (AFRES)
932 AAG (Assoc)

GLOBAL NOTES

MAC Safety Awards For Excellence In Airmanship

The Safety Award for Excellence in Airmanship is MAC's way of showing appreciation to aircrew members who prevent a serious mishap through high-quality performance during an inflight emergency not of their own making. The winners noted here are among the first to earn the new award.—Ed.

Captain Colley and crew. In addition to nominations for several other laurels, Capt Robert E. Colley and his crew from Travis AFB, California, were recently presented the MAC Safety Award for Excellence in Airmanship. On takeoff from McMurdo Station, Antarctica, the crew's C-141A suffered a gear malfunction that made it impossible to retract the right-main wheels. After consultation with MAC and Lockheed experts, the crew reconfigured the aircraft so they could cruise at a higher altitude and reach Christchurch, New Zealand. Due to the crewmember's professional airmanship, the Starlifter was safely landed (despite crippled gear) with minimum damage and no personnel injuries. (For complete details of this exciting mishap, see "How to Plan a Crash Landing" in the February 1980 *TMF*."

(Inset): Capt Colley, AC; (Standing, left to right): Maj Hartzell, Pilot; Lt Crozier, Pilot; Lt Col Jackson, Nav; Capt Bachman, Nav; (Kneeling, left to right): MSgt Reynolds, FE; MSgt Schneider, FE; TSgt Friedrich, LM; TSgt Stark, LM.

Captain Korver and Captain Mason. Flying as pilot and copilot respectively aboard an HC-130H, the captains prevented a catastrophic mishap by making a timely decision to abort a takeoff, and then exercised exceptional airmanship in carrying it out. While the Rescue Hercules was accelerating on the takeoff portion of a touch-and-go landing, Captain Mason realized that he could not turn the control yoke to the left past the neutral position. Recognizing that aircraft control was in jeopardy, Capt Korver commanded, "Reject!" The crew successfully stopped the airplane in the remaining 2,600 feet of runway. Maintenance investigation exposed a major flight control problem that would have made it impossible to turn the yoke to the left in the air.

Capt Johannes T. Korver, AC

Capt Frank R. Mason, Jr., Pilot

Captain Barbee and crew. After takeoff from a remote site with 11 passengers aboard, Captain Barbee felt a jump in the HH-53's flight controls and the flight mechanic, MSgt Rose, noticed a momentary fluctuation in the primary hydraulic system. The crew then felt a yaw kick and saw a fluctuation in the auxiliary hydraulic system. Soon afterward, several caution lights came on indicating possible number one engine failure. The crew prepared for an emergency landing, including securing the passengers, while the pilots found a safe touchdown zone among the hills, powerlines and flooded rice paddies. Despite multiple malfunctions, hydraulic problems and frequent yaw kicks, Captain Barbee safely landed the Jolly Green on a narrow road between some powerlines and a rice paddy.

Later investigation showed that the problems were caused by a loose cannon plug on the number one generator, causing numerous systems to cycle on and off. The crew's superior skill and professional knowledge prevented loss of life and a serious mishap.

Capt Leonard F. Barbee, AC

Lt Van J. Leffler, Pilot

MSgt William L. Rose, FE

SSgt William L. Hernendez, PJ

Capt Haile and crew. On initial takeoff for a training mission, their Starlifter abruptly entered a 30-degree left bank at about 100 feet AGL. While the pilots fought to regain aircraft control, the scanner reported that the left aileron appeared to be jammed in the up position. Using full right yoke input, full right aileron trim, rudder and differential power, the crew was able to get the C-141's bank decreased to about 10-degrees left. For the next three hours the three pilots took turns flying while the crew tried various solutions suggested by technical experts on the ground, all to no avail. They then climbed to 10,000 feet and performed a controlability check. With 60-degrees flaps and gear down, they could maintain a level flight attitude and even get a shallow right turn. In that configuration, the aircraft was flown to a safe landing.

Investigation by Warner-Robins Air Logistic Center revealed a stainless steel bolt lodged at the pivot point for the aileron tab drive push-pull rod. The crew's initial quick reactions and subsequent coordinated efforts in handling their inflight emergency prevented a serious flight mishap.

Capt Raymond F. Haile, AC

Capt John F. Bridges, Pilot

Capt John D. Hauck, Jr., Pilot

TSgt Edward F. McConahy, FE

SSgt Joe N. Bolden, FE

Dynamic rollover and ground resonance can occur during air-ground transition but fortunately both are preventable.

Helicopter's Mr. In-Between

by Dan Manningham

Takeoffs and landings are critical maneuvers in any aircraft. Although takeoffs and landings in a helicopter are inherently safer than those in fixed-wing airplanes because of the minimal speeds involved, they do entail some unusual problems. During that brief transition, when the helicopter's weight is supported partially by rotor lift and partially by the landing gear, there are two uncommon threats to safety: dynamic rollover and ground resonance. Here's a look at the challenges of both phenomena.

Dynamic Rollover

Dynamic rollover is a threat when one landing gear is in contact with the ground while the helicopter is essentially hovering. During that transitional condition of near-hovering flight, the helicopter's roll inertia may be altered by the contacting gear in a dangerous fashion that effectively neutralizes roll control authority. Dynamic rollover apparently is a factor in several accidents each year, and yet this simple phenomenon has only recently been defined.

When a helicopter is partially airborne, with one wheel or skid on the ground, it is subject to unusual motions and different control reactions than those of a free hovering aircraft (Figure 1). In normal free flight, all roll motion is around the helicopter's center of gravity so that rolling momentum (H) is simply the product of roll rate (w) and mass (m). In mathematical language, H=wm. The manufacturer calculates roll momentum and designs enough control authority into the rotor system to compensate for some reasonable maximum. In flight, there is enough lateral cyclic authority for all predictable flight regimes. It is extremely unusual to run out of roll control in a completely airborne helicopter for that very reason. Roll control has been carefully matched to meet and exceed roll momentum.

When one wheel or skid is resting on the ground while the helicopter is mostly airborne, however, that careful balance of roll control and roll momentum is upset. With a gear on the ground, a rolling momentum may develop which far exceeds the authority of roll control.

When one skid is effectively in contact with the ground, the helicopter rolls about that pivot point rather than about the CG with a marked change to the momentum formula (Figure 2). Now those basic elements of mass and roll rate are multiplied by the square of the distance from the pivot point to the CG. That distance is abbreviated "R"; and the new formula for roll momentum is $H=wmR^2$. When a skid or wheel is grounded and R^2 enters the formula, the rolling momentum of your helicopter will increase by a factor of at least four, and as much as eight.

Once it has started, that rolling motion about a landing gear develops an inertia that exceeds the rotor system's roll authority. When that happens, dynamic rollover is inevitable.

Awareness Factors

Several elements contribute to the dynamic rollover situation and helicopter pilots should be aware of each individual contributor:

- Pocked or rutted surfaces are always suspect because they set the stage for a tangled landing gear.
- High gross weights increase the potential for rollover because they induce higher rolling momentum.
- High vertical CGs are extremely destabilizing because they lengthen the distance to the landing gear pivot point (R). And remember that distance is squared in the formula.
- High roll rates induced by the pilot during takeoff translate into high rolling momentum. Thus, to the degree that he is capable of smooth and careful control inputs, the pilot is a significant factor in preventing the onset of dynamic rollover.

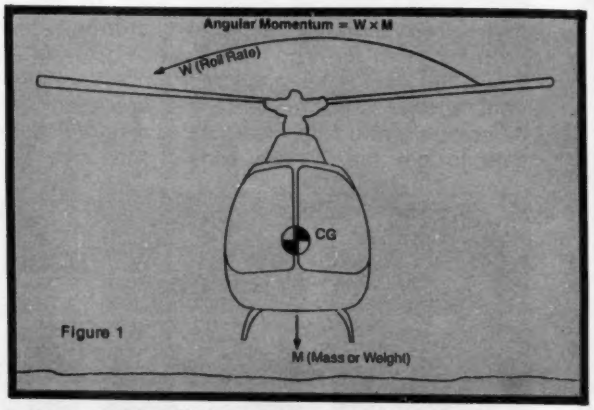


Figure 1

In the normal free flight condition, all roll motion is around the helicopter's CG, and roll momentum is a product of roll rate and mass only.

• Three conditions will induce unwanted roll: lateral CG offset, crosswinds and fuel slosh. Fuel slosh usually has only a minor effect but crosswinds and off-center loading can induce enough roll to influence the equation.

• Tail rotor thrust and its moment arm create a destabilizing moment for a right-wheel case and a stabilizing moment for the left-wheel case in U.S. manufactured helicopters.

In all cases, the helicopter's weight provides the primary correcting moment, and thrust (lift) is the primary destabilizer. In other words, dynamic rollover is most readily corrected by dumping collective to eliminate main rotor thrust and its roll vector, and allowing the helicopter's weight to overcome rolling momentum. Beyond a very minimum bank angle, cyclic control cannot overcome that tremendous inertia—but weight can.

Consider the worst case. The helicopter is sitting on a slope with the right skid uphill. Weight is at maximum with a high CG. A crosswind is blowing upslope. With full right cyclic, to compensate for the slope, the pilot pulls the collective a little too abruptly.

Now the helicopter is pivoting about the right skid, as it must do to lift off in a level attitude. In this case, however, the abrupt collective increase, together with the destabilizing crosswind and high tail rotor thrust combine to create a roll rate that is excessive and a rolling momentum four to seven times greater than it is in free flight.

Note this insidious element: roll rates and accelerations that are normal and acceptable in flight are extremely hazardous with a gear on the ground. Thus, a pilot encountering dynamic rollover may not recognize it as such because the roll rates involved are usually within a range which he has learned to use comfortably and safely in flight.

Now the helicopter is passing through horizontal as it rolls about the uphill right skid. The pilot counters with an input of left cyclic which he knows from flight experience is enough to counteract the perceived roll rate. Unfortunately the helicopter's rolling momentum about the skids is roughly six times that to which he is accustomed, so his cyclic input is not sufficient to counteract it. The upslope roll rate diminishes slightly but does not stop.

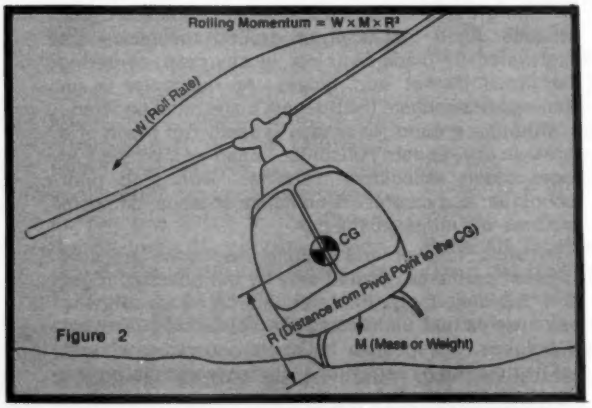


Figure 2

With one wheel or a skid in contact with the ground, the roll rate is magnified by the distance between the CG and the new pivot point and can quickly exceed available roll authority.

At this point the helicopter is in a critical condition. Rolling momentum now exceeds lateral control authority so that even full left cyclic is not sufficient to stop the upslope roll. The only restoring moment large enough to overcome that roll inertia is weight. If the pilot rapidly bottoms the collective now, the helicopter will settle back onto both skids. If that action is too slow or too limited the restoring moment may not be enough. Whenever lateral control is compromised with a landing gear on the ground, the only sure way out is to reduce collective immediately and completely, and be careful not to bounce on the downhill skid.

Bear in mind that dynamic rollover is not limited to slope operations. Any combination of lateral cyclic in conjunction with moderate collective from a ridged or rutted surface could induce a rolling motion about the landing gear pivot point. In all cases there are specific pilot actions that can minimize the threat.

• Be aware of the destabilizing elements: high CG, high weight, crosswind, slope, rough surface, offset lateral CG and high-altitude landing site. Mentally evaluate the degree of risk and be prepared to reduce collective immediately and abort the takeoff.

• During the takeoff use smooth, careful control inputs to minimize roll rates. Remember that roll authority with a gear grounded is one-fourth to one-eighth of what you are accustomed to. Your best defense is reduced roll rate.

• Keep all bank angles to an absolute minimum. Five degrees could be too much in an extreme case.

If lateral cyclic seems sluggish or insufficient, reduce the collective and try again. Never pull collective suddenly to get airborne, as a large and uncontrollable rolling moment may result.

Dynamic rollover is a real but subtle threat to helicopter takeoffs. Any time that thrust is approximately equal to weight and one wheel or skid is on the ground, keep the aircraft trimmed and do not allow roll rates to build up. Fly the helicopter slowly and smoothly off—or back onto—the ground. Dynamic rollover is a fact of life but any competent pilot can zero the risk with a few simple precautions.

Ground Resonance

In order to understand helicopter ground resonance, you need to understand the basic concept of resonance itself.

Mechanical resonance is the response of an object to an externally applied oscillatory force or vibration. Soldiers marching in step on a bridge, may induce a resonance or wave motion to the bridge structure. If the natural damping effect of that structure is strong enough, energy from those marching steps will be

harmlessly absorbed.

When a system is vibrated by some external source at a frequency and amplitude that are not well damped, energy is acquired bit by bit until the amplitude of the system vibration becomes much larger than the amplitude of the external force. In this case energy is being added to the system faster than any natural damping tendency can dissipate it so that energy builds to troublesome levels. If the bridge structure in our example is poorly damped, the energy from those marching steps will dominate and could even destroy the bridge.

One classic example of destructive resonance is the Tacoma Narrows Bridge disaster which occurred in 1940. With a main span of 2,800 feet, this narrow, flexible suspension bridge (nicknamed "Galloping Gertie" after the accident) was the third longest span of its type in the world at that time.

Four months after its completion, a 42-knot gale induced oscillations in the span which increased in amplitude until it broke apart, ripped loose from the cables and fell into the water below.

Investigation revealed that the bridge lacked natural damping to counteract an inherent aerodynamic instability.

That 42-knot wind induced oscillations which the bridge structure could not dissipate, so they progressively built into destructive amplitudes. Fortunately, no one was on the bridge by the time it collapsed.

Helicopter ground resonance is a condition that can be derived from the union of two resonant modes, the roll mode of the landing gear and the lead-lag mode of the rotor blades. It can literally destroy a helicopter in seconds.

Ground resonance is not a serious threat to helicopters with teetering or hingeless rotors. In general, only articulated rotors are prone to resonate at a destructive frequency, although the newer articulated rotor helicopters are nearly immune. Sikorsky's S-76, for example, employs a differential spring that reduces the landing gear roll-mode frequency far below the point at which it might coalesce with the lead-lag mode from the articulated rotor. As a result, it is virtually impossible to induce ground resonance in this helicopter even with the articulated head.

The sequence begins when a mechanical shock is transmitted from the landing gear, through the fuselage, to the rotor head (or vice versa). That shock could be a wheel bump on landing, a wind gust on the rotor, an abrupt control input or any sudden jolt.

At the rotor head this shock causes the blades to sequentially lead and then lag out of their symmetrical orientation. In a four-blade rotor, for instance, it may jolt the blades into a cyclically unbalanced 88-degree to 92-degree to 92-degree to 88-degree relationship instead or their normal, even 90-degree spacing. Once the rotor is sequentially disturbed, its natural lead-lag resonance will feed down through the fuselage to the landing gear. If the natural roll mode of the landing gear is close to the lead-lag mode from the rotor head—the way it is in several older helicopters—it will respond and amplify. Now those two modes, the lead-lag mode at the rotor head and the landing gear roll mode, begin to reinforce each other or coalesce, and the energy builds far beyond the damping qualities of the helicopter's structure. After initiation, ground resonance may appear like a rolling or pendulum oscillation as the helicopter bounces between gear strikes and rotor head jolts. A crew experienced ground resonance in a Navy, narrow-gear S-58 which amplified within three to four seconds into a jolting, shuddering convulsion that would have thrown the pilots out of their seats except for their fastened harnesses. Unless immediate action is taken, such self-exciting oscillations will increase to damaging and even destructive levels.

Corrective action by the pilot involves breaking one or the other of those resonant modes. There are two basic options:

- If rpm is high enough, the helicopter should be lifted out of contact with the ground to eliminate the ground roll oscillations. That action is the very best option and will positively stop the ground resonance.
- If the rpm or other conditions prevent an immediate liftoff, only an immediate change in rotor rpm can untune that damaging lead-lag resonance once it has begun, and that may not be possible without a substantial and immediate application of rotor brake. Simply bottoming the collective will allow rpm to decay but at a rate which may be too slow to untune the resonance prior to serious damage. Still, a closed throttle is probably your best bet if takeoff is not possible, with some experimental collective as a last ditch effort to break the resonance. If the helicopter is on level ground, it may be helpful to center the cyclic because some instances of ground resonance are aggravated by blade flapping. In any case, centering the cyclic cannot hurt unless the helicopter is on sloping terrain where the tip-path plane must be tilted.

Although ground resonance is really not much of a threat in any modern helicopter, it can be a problem in some older, articulated machines. But good pilot technique, and careful maintenance of oleos, dampers and tires will minimize the risk.

Dynamic rollover and ground resonance are very different problems, related only by the phase of flight to which they apply. Pilots should be aware of these two hazards and understand the appropriate recovery techniques. Prospective helicopter operators should not be deterred by sensational stories which distort the significance of these two phenomena.

Reprinted from "Business and Commercial Aviation"
Copyright 1979, Ziff-Davis Publishing Co.

Fascinating reading for aviation buffs.

BOOK REVIEWS

by Major James G. Gibson II
Supervising Editor

Have we got a deal for you if you're interested in airlift or flying in general, or in war stories connected with these two subjects. Rummaging around in the base library, we came across some really nifty books relating to various aspects of our profession. Here, without further ado, are brief reviews of several which we read and found particularly worthwhile.

Over The Hump, by General William H. Tunner. This book is the *Roots* of airlift. General Tunner was instrumental in setting up the "Ferrying Command" from scratch back in 1941, and he was intimately involved (usually at the helm) in every major airlift operation and activity from then until his retirement in 1960. Throughout his career, Tunner fought a virtual crusade to make airlift a respected part of the military's flying arsenal. He proved how vital aerial resupply was when he ran the show in the China-Burma-India theater (the Hump), the Berlin Airlift, in Korea, in Europe, and finally as commander of MATS. Tunner's often unorthodox (bow-wave) approach for getting things done despite opposition from the bureaucracy and the military establishment, and his colorful recollections of landmark events in airlift history make very interesting reading.

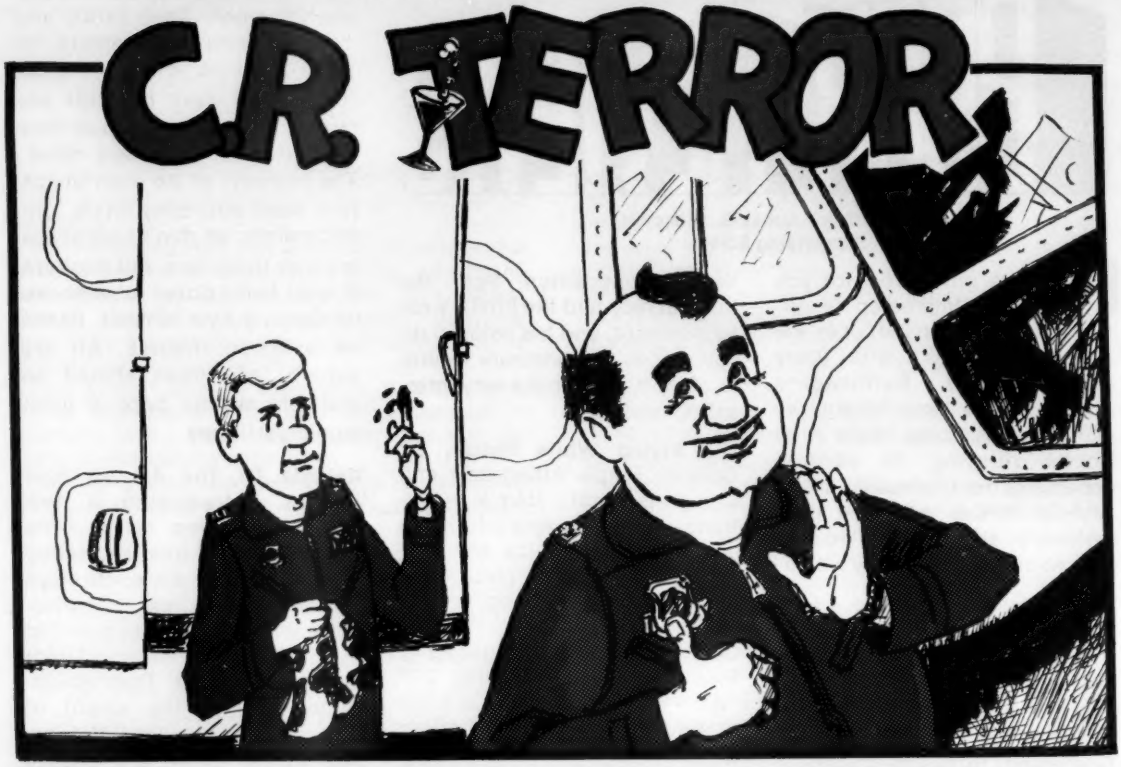
The Flying White House, by Colonel Ralph Albertazzie and Jerald terHorst. Here's everything you ever wanted to know about the mechanics and machinations of the presidental airlift operation. It begins with FDR's Douglas C-54, "Sacred Cow," and continues right up to President Carter's Boeing 707, "Air Force One." Colonel Albertazzie, now retired, offers an extremely frank and candid look at what it's been like for the pilots and crews associated with various presidents and key White House staffers during many of the events that shaped world history and made headlines—plenty of intrigue and insider's tidbits. As the reviewers are wont to say, "You'll find this a difficult book to put down."

Band Of Brothers, by Ernest K. Gann. If you like a good mystery and war stories about flying adventures, this novel will intrigue you. It combines both elements as four professional pilots go to Taiwan to try and discover the real cause for a fatal commercial aircraft crash. Their exotic and heroic efforts to exonerate the pilot, who is an old mutual friend, and save his hide are related with Gann's usual flare for authenticity in every detail. The intensity of the story builds to a heart-pounding finale. Unfortunately, we don't have space to cover them here, but there are at least half a dozen *other* books by Gann, a flyer himself, based on aviation themes. All are superb, and most should be available at your base or local municipal library.

Knights Of The Air, by Ezra Bowen. Introducing a new Time/Life series called "The Epic of Flight," this fascinating book comes alive through personal accounts, recollections and memorabilia provided by hundreds of aviators from around the world. They actually experienced the advent of winged warfare during WW I, are still around today, and eagerly contributed. It's all here, captured, chronicled and graphically illustrated with historic photographs and excellent detailed drawings—the men and flying machines, the heroics and sudden death in dogfights, and the overall adventure and chivalry that made up the colorful panoply of aerial activity during WW I. If this premier volume is representative of what's to come in the series, we have a lot to look forward to in the future as the "Epic of Flight" unfolds.

The Helo Honcho's haste in launching a mission gets him in the end.

C.R. TERROR



Why that's just normal seepage, Sammy m'boy," C.R. quipped, dismissing the H-3's oily main transmission with a wave of his hand. "Back when I was flying H-19s, I never felt comfortable unless there was at least a little puddle of oil or hydraulic fluid underneath the moving parts," laughed the Venerable Vertical Lifter as he clambered down the side of the Jolly Green with the grace of an overweight walrus. "Besides," he added, "the sight gauge indicates full."

"Just the same, sir, we probably ought to check it out before we leave," the conscientious copilot insisted as he followed his leader down the foot holds.

"Okay, Sammy, if it'll make you feel better we can have Sergeant Torque wipe it down and check for leaks and lesions after we start up," the Magnanimous Major conceded, patting his copilot patronizingly on the shoulder after both had returned to terra firma. "But the sooner we get this windmill churning the better I'll like it," C.R. said, wiping his brow. "Here it is only 11 a.m. and already this ramp is like a steam sauna."

"The weather people said it was supposed to get up into the high 90s today and stay hot all through the Fourth of July weekend," Sam reminded.

"Hot as the proverbial firecracker, huh Sam?" C.R. chuckled.

Just then Sergeant Max Torque pulled up in a pickup truck. "The sling load is all rigged and ready to go, sir," he called to the perspiring pilots. "Marshallers are standing by on the grassy area between the taxiways."

"How's the weight," queried C.R.

"It checked out at just over 2,000 pounds," answered Torque.

"Piece of cake," chortled the Chopper Chieftain," adding as an afterthought, "Have you seen any signs or our PJ?"

"Oh, yes sir," replied the NCO. "He's checking out some additional equipment to drag along. Said something about

wanting to take every possible precaution to insure his survival on this mission."

"My word," observed C.R. "Sergeant Rappel must think we're going on a SAR to downtown Hanoi instead of delivering one-each bilge pump to an oceanographic research ship. It's only 50 miles off shore—practically in the local pattern. Why don't you drive back and give him a hand with his gear," C.R. suggested. "We'll finish the preflight and be all set by the time you two get back." As Torque drove away, C.R. began a discourse on the advantages of the low response cargo sling installed on the H-3 for this mission. "Yes, Sam m'lad, back in the olden days, cargo slings were much more susceptible to oscillations in forward flight. Couldn't cruise nearly as fast with an external load as we can now."

The Specious Spellbinder was still extolling the virtues of the "swing-sling" when Torque and Sergeant Rappel, the always-prepared-for-anything para-rescue specialist, arrived with a truckload of survival equipment which included scuba gear, extra life rafts, a portable bilge pump, a foot locker full of first aid supplies, a couple of parachutes, and even climbing boots and crampons.

"What'cha gonna do with all that equipment there, Sergeant Rappel?" the Rotund Rotorhead asked, smiling facetiously.

"Nothing, I hope, sir," the good-natured PJ replied. "But it always pays to be prepared for the worst. Oh, by the way, sir, operations wants you to give them a call on the radio—something about that research ship taking on more water than they can manually pump overboard."

As C.R. talked to Rescue Ops, there was a preceptible change in the pitch of his voice, indicating a definite escalation in the flight's urgency. "Well Sam, looks like that ship is going to be in real trouble if we don't get a pump out there ASAP. The fickle finger has upped this semi-routine support mission into a bonafide numero uno priority launch to save an entire research vessel from going PCS to Davy Jones' locker. Let's crank 'em."

Sam sat in the copilot's seat trying unsuccessfully to keep up with the unique Terrorific cockpit procedures. As the Master Manipulator's left hand darted from the rotor brake, across the circuit breaker panel, down to the fuel panel, then back up to the speed selectors, his right hand adjusted the flight instruments and tail rotor pedals.

"Contact," shouted C.R. through the intercom. Sergeant Torque acknowledged the non-standard terminology which he knew by experience could mean almost anything. At the same time, Sam was somewhat overwhelmed by the flurry of flying fingers and hands from the adjacent seat. He followed along in the checklist as best he could, picking up items the Chief Rotorhead either forgot or considered unnecessary so that they could, as C.R. put it, "get the show on the road." He was barely able to turn the anticollision lights on before the Hasty Honcho pressed the number one starter. Sam was muttering the final engine start checklist when he looked up and saw C.R. disengage the rotor brake. He managed to call out "clear left" only after the rotor blades began whirling, instantly creating a welcome breeze through the open cockpit windows.

As soon as Sergeant Torque was inside the door, the Single-minded Sultan of Sling-Wings released the parking brake and the big helicopter began to move forward. "Time's a wasting, m'lads," crackled C.R. as he increased taxi speed and headed toward the pickup point.

"Cleared to hover taxi," long suffering Sam said breathlessly, relaying the tower clearance and finally catching up with his AC in the checklist.

C.R. raised the collective while they rolled along and smoothly brought the helicopter to a stable hover over the five-foot-high bilge pump. As the marshaller positioned himself out front and began signaling, C.R. gently lowered the aircraft over the pump like a mother hen over her prize chick.

"The load's hooked, sir, take it up ten feet," Sergeant Torque said, peering underneath the hovering craft.

"Up we go," C.R. announced, raising the H-3 and its external cargo 50-feet above the ground. "Power looks good, let's be on our merry way. How's it riding at 30 knots?" questioned the Vertical Lift Lothario.

"Riding stable, sir," Torque replied.

"Okay then, we'll increase speed," C.R. reasoned, quickly settling on 70 knots as the highest speed at which the dangling bilge pump would remain stable. "Now that's the way to sling an external load, Sammy," he bragged as they crossed a sparsely populated stretch of beach and headed out over the gulf. "Water looks like a lake today," C.R. observed as the coast line retreated behind them. "Should be no sweat hovering over the fantail of that ship in calm seas like this. Here, Sam m'boy, take the controls and get the feel of it," C.R.

suggested, relinquishing the cyclic stick to his trusty sidekick. "Ever tell you about the time in SEA when I slung a whole transmission into the jungle to recover an H-3 from behind enemy lines."

"Not lately," Sam murmured, taking the cyclic in his right hand and bracing himself mentally for the non-stop war story that was about to commence. Oh well, he thought, it's only about a 45-minute flight out to the ship. They droned on at 70 knots over the glassy blue-green seascape.

By using the coastal tacan and the ship's ADF, Sam had no trouble locating the vessel just as C.R. was mercifully bringing his tall tale to a close. "And ever since then," he concluded, "I've always had a fond spot in my heart for elephants. Yes, Sammy, if it hadn't been for old Jumbo there in the jungle we surely would have wound up in a VC prison camp."

"Research ship dead ahead," broke in Sergeant Torque, spying their objective from the jump seat.

"So it is," C.R. noted. "My, what a short flight. Sam, why don't you make the approach to the boat and drop off the load? Gotta learn sometime ya know," proffered the Generous Gyrator. "I'll give 'em a call and see if everything's shipshape on the fantail," he added, keying the mike with his plump pinky.

Sam established a normal approach angle to the helipad on the stern of the ship. C.R. sat with folded arms and a watchful eye. At 75 feet above the deck the aircraft shuddered momentarily as it slowed below translational lift airspeed. The skilled second-in-command brought the helicopter to a hover with the

pump hanging directly over the middle of the landing pad.

"Down . . . slowly," Sergeant Torque began directing from the open cargo door. "Ten feet to go. Deck is stable. Five feet to go—right, two feet. Load's on the deck—come down two more feet. Okay, release load." With that, Sam pressed the disconnect button and the cables fell around the big pump which now sat squarely in the center of the helipad. "The load's released, up ten, nice job, sir," Torque announced evenly.

"Perfect," added Rappel enthusiastically.

As C.R. acknowledged the greatful thanks of the ship's captain over the radio, Sam pushed forward on the cyclic, easing the H-3 into forward flight off the right side of the ship. "Well done, Sam m'lad," C.R. congratulated his competent copilot while at the same time assuming control of the aircraft in order to circle around for a Terrorific flyover. "The captain says they'll be pumping water in 15 minutes," C.R. announced as they passed 50 feet above the vessel's stacks, heading north back to Gulflin AFB. "Yes Sammy, that was as nice a sling approach as I've ever seen" complimented the Corpulent Commander, nestling back into his seat for the short return flight to the coast. "An admirable way indeed to consumate a mission and begin a joyous holiday weekend. And if the doppler is correct we have picked up a 15 knot left-quartering tailwind which will get us back even earlier than planned," intoned the King of the Collective. With that, thoughts began turning to visions of fireworks, picnics, and assorted other recreations each of them planned for the next day's Fourth of July celebration.

Spirits were high as Sam noted out loud the 20-mile DME reading from the tacan, while C.R. finished a raucous rendition of Red Sails in the Sunset. "We should be able to see the water tower on the . . ." Sam was cut off in midsentence by Sergeant Rappel shouting over the intercom. Both pilots looked back just as a gusher of oil splattered on the cargo floor directly under the transmission.

"Gadzukes!" C.R. yelped, and Sergeant Torque sprang out of the jump seat to investigate.

"Looks bad, sir," he reported. "Coming from somewhere around the transmission."

"Oh, no, *the normal seepage,*" Sam said under his breath, remembering the leak check they were going to do before getting launched took priority. "Temperature's climbing fast," he reminded C.R. who looked on helplessly as the transmission oil pressure started fluctuating wildly. Beads of perspiration began rolling off his forehead. Then . . . .

"Chip light!" C.R. blurted out, barely able to maintain the little composure he held in reserve. "This is it, folks. We're going in the drink. I'll land straight ahead." Sam instinctively hit the mike, giving Gulflin approach a position report 20 miles due south of the tacan, while C.R. lowered the collective and entered an autorotation from 500 feet above the water.

With 50 feet to go, C.R. pulled back on the cyclic, flaring the aircraft and slowing the forward speed and rate of descent. Sam nudged the collective up to prevent the rotors from overspeeding. The amphibious helicopter's boat hull splashed into the water going only 20 knots and quickly stabilized.

As soon as Sam pulled the speed selectors back toward idle to slow the rotor rpm, the left engine's bright red fire light blinked on. In his elevated emotional state, that's all C.R. had to see. "Abandon ship!" he howled. "Every man for himself!" Although Sam tried to tell him the light had only flickered on momentarily and was probably caused by the tail wind blowing hot exhaust back across the overheat sensors, it was too late. The Over-reacting Aeronaut had already jettisoned his cockpit window, inflated his underarm life preserver and was attempting to force his considerable bulk out the opening. Snagging his mae-west on the lip of the hatch in the process, C.R. finally popped through the hole like a champagne cork. Sam could only sit there dumbfounded at the spectacle of his mentor's empennage disappearing out the window to the accompaniment of loud hissing sounds from the rapidly deflating preserver, gasps of unintelligible gibberish and a plume of salt spray as the Weighty Warrior entered the water like a rock. After shutting down the engines and securing the cockpit, Sam climbed out of his seat to help retrieve his AC, who was rapidly drifting away. He found that Sergeant Rappel, who had been suited up in his scuba outfit all along, was already on his way out to bring the Soggy Skipper back.

Sergeant Torque was the first to spot the dorsal fins cutting effortlessly through the water less than 10 feet beyond where C.R. was thrashing about. "Sharks, sharks!" yelled Torque, with Sam joining in the chorus. Both swimmers stopped dead in the water as the dreaded word hit them like a shot. In an instant, C.R. was transformed from a bobbing blob with flailing and splashing appendages into a human torpedo, heading straight back to the helicopter at an incredible rate of speed. At the same time, Sergeant Rappel had also turned himself around and was heading in the same direction as fast as he could swim. Although Rappel had only half the distance that C.R. had to travel, he arrived at the open door a scant three feet ahead of the Terrorific Torpedo. With one quick movement he jumped aboard and turned to grab C.R.'s arm. The fins were just inches away when he heaved the Water-Logged Leader out of the brine. As both soggy feet flopped up on the doorway, the extra weight became too much for even the physically fit PJ to negotiate. Losing his balance, C.R. sat back into the water briefly before Sam grabbed his other arm to stop the fall. Just then one of the sharks glided by, bumping C.R.'s bottom with his sandpaper-like nose. The Terrified Terror bolted through the door and clear across the cargo compartment, nearly going out the left-hand window.

"You okay, boss," Sam stammered, steadying his skipper.

"I will be as soon as I persuade my heart to remove itself from my throat," C.R. gasped as he thanked everybody for their help. Resuming command after his brief absence, C.R. ordered Rappel to deploy the sea anchor and asked Sam to radio for a tow boat.

"Got ops on the horn, sir," Sam reported. "They're going to launch the boat as soon as they can. In the meantime, they said for us to sit tight and not to worry. Shouldn't take more than about five hours to tow us back."

"Not exactly the glorious ending to our triumphant mission I had in mind," C.R. mused, peering at the dorsal fins still silently circling the floating helicopter. "But I guess it beats the ending *those* critters had planned for my pink body. Here, Sergeant Torque," offered the recently chomped-at Chopper Pilot, "let me take a turn at the bilge pump."

QUICK STOPPERS

Pitot Problem "Uncovered"

Cruising along at FL 370 over the Pacific Ocean, a C-141 crew was surprised when the number two mach and airspeed indicators went inop. They were even more surprised a little later when they figured out that number one mach and airspeed indicators were no longer accurate either. Using ground speed from the INS and EPR to maintain flying speed, they continued to their destination. Troubleshooting efforts along the way failed to reveal any obvious culprit. To maintain airspeed on descent and approach for landing, they joined up on another aircraft and followed it down. When maintenance troops disassembled the Starlifter's pitot-static system, they were able to drain almost half a quart of water from it, and after reassembly, it ops checked okay. Estimates are that the considerable moisture got into the system while the plane was on the ground for 37 hours at Guam. Several of the island's customary and frequent rainstorms, coupled with a lack of pitot covers, filled up the tubes, which promptly froze at altitude and caused the airspeed and mach indicators to go haywire.

Failure to Communicate

It's an old bugaboo, but it can get you into a heap o'trouble, as the following examples involving clearances clearly show.

Recently, a commercial DC-10 cleared the active after landing with instructions to hold short of an intersecting runway. The captain missed the transmission, but the first officer *thought* they were cleared to proceed and assured the left-seater that such was the case. As the wide-bodied jet nosed across the runway, a B-727 was forced to abort its takeoff in order to avoid a collision.

In another incident involving muddled messages, a B-727 first officer read back "230", on an altitude clearance. The controller missed the altitude part of the readback, but assumed it to be correct anyway and didn't ask for a repeat. As a consequence, the 727 narrowly missed a DC-9 when it leveled off at the wrong altitude.

Because of these and a multitude of similar communications mixups, the NTSB urges that clearances be repeated as given, both in content and order. Additionally we should all strive to listen more carefully, speak clearly, assume nothing, and whenever even the slightest doubt exists—V E R I F Y.

—Adapted from Gulf Air's *Flight Safety Bulletin*

Say Again Altimeter, Please . . .

At 100-out on the way to a British base, a C-5 crew received an altimeter setting of 29.83 from London military radar control. A little closer in, when they contacted a destination area controler, they received a setting of 29.38. Suspicious of possibly transposed numbers, they questioned the second setting and had it confirmed. On the approach, the destination final controller gave them a setting of 29.83, and they promptly executed a missed approach to buy time and sort things out. While in the pattern on go around, they recontacted the area controller, asked him once again about his curious setting, and he replied, "29.38 is what's on my board, but I'll check on it." When he came back up on UHF a couple of minutes later, the controller apologetically admitted that his board had been in error and that the setting actually was 29.83 after all.

An erroneous altimeter setting of only a few tenths in the altimeter's barometric pressure scale window can put your airplane hundreds of feet above or below your intended altitude—an extremely hazardous situation at any time, but especially while you're maneuvering in a term inal area. It never hurts to check settings you get from controllers against those predicted on your weather flimsy.

Dynamic Rollover Is Where You Find It

During a "routine" takeoff to hover from level ground, an Army UH-1 rolled over on its right side, causing the main rotor to hit the ground and separate. The Huey came to rest inverted and was extensively damaged. Investigators determined that the pilot didn't detect an abnormal roll rate until it was too late because he was busy trying to take off and clear the aircraft simultaneously. His activities resulted in inadequate visual cues and probably an inadvertent right lateral cyclic input when he turned his upper torso to the right to check for maneuvering room. Also, the pilot was not expecting a roll rate to develop because he was unaware that rollover could occur during normal takeoffs from level ground. A Murphyesque touch that just about guaranteed there was going to be trouble for this hapless helo honcho was an improper adjustment of the tail rotor pitch-change links, which caused a reduction of available right pedal, and increased the right rolling moment while the right skid was on the ground during liftoff.

"Which-A-Tow" Lineman

A lineman for the Navy drove his tow tractor inside a hangar, parked it near the horizontal stabilizer of a Navy P-3A and went into the maintenance control office to sign off a writeup. Returning to his tug about 15 minutes later, he blithely started it up and proceeded to exit the hanger via a route which took him beneath the wing of an adjacent P-3. To his shock and amazement, he was suddenly brought up short when a "hitch-hiking" workstand he had unknowingly acquired collided with the trailing edge of the P-3's aileron. During the driver's brief absence from his tow vehicle, two maintenance types who no longer needed the workstand connected it to the tractor—without bothering to tell anybody.

K-loaders Needed a Double Check

It was the ideal tableau for a taxi accident. One lonesome marshaller at an enroute base was trying to guide a C-141 into a parking spot, at night on an unlighted ramp without painted guidelines. Positioned near the intended block-in location were two 40-K-loaders. One was painted yellow and the other olive drab, but neither of them, nor the aircraft's right wing, could be seen by the marshaller as he waved the Starlifter into a 90-degree left turn for final positioning. Spotting the close proximity of his right wingtip to the yellow K-loader, the copilot called for a momentary halt in the maneuvering to check the clearance from the cockpit, satisfied himself, then gave the go-ahead. Unfortunately, he missed seeing the inconspicuous olive drab K-loader next to the more visible yellow one, and the result was an impact that seriously damaged the aircraft's wing. Luckily, no fire broke out, even though the smash released several thousand pounds of JP-4 from one of the wing tanks. Although it may seem more troublesome at the time, the extra few minutes spent deplaning a scanner/wing walker from the crew—whenever there is the slightest question about available "elbow-room"—will be well spent if a taxi accident is prevented in the process.

Notable Quote

Some people look upon flight safety much as they do religion: something which they do not really believe in, but they can't afford to ignore just in case it exists.

—Royal Air Force's *Ostrich*

AFTER DEADLINES

NINE MAC CREWMEMBERS SET A USAF record on Sunday, 8 June 1980, when they departed Scott AFB on the "Airevac 666" mission. The entire aircrew aboard the C-9 Nightingale was made up of female flyers from the 375th Aeromedical Airlift Wing. Capt Susan Regele commanded the mission, Captains Christine Schott and Cynthia Costello flew as co-pilots, and the flight mechanic was A1C Genita Martino. Medical crewmembers included Capt Catherine Young, Medical Crew Director; Capt Patricia Boland, Flight Nurse; SSgt Michele Varney, Charge Medical Technician; and SRAs Linda Sappington and Marilyn Bates, Medical Technicians.

First USAF all-female flight crew.

Mt. St. HELENS' BLAST TRIGGERED AN IMMEDIATE RESPONSE from the 304th Aerospace Rescue and Recovery Squadron (AFRES) based at Portland, Oregon. The MAC-gained unit, along with other aircraft and crews from Norton, McChord and McClellan Air Force Bases, helped save 56 lives in the first two days after the volcano blew its top.

MAC's FUEL-SAVING PROGRAM GOAL is to save $15-million this year while still providing global air transport and other services. A combination of the latest computer technology, flight plan adjustments and reductions in excess fuel carried should save MAC more than $1-million per month. To achieve that, we all must think conservation from mission show time to block in.

NATIONAL SAFETY COUNCIL AWARD WINNERS. The Headquarters USAF Safety Awards Board approved 531 MAJCOM nominations for 1979 National Safety Council Awards; MAC won 207 of these awards. The NSC's highest laurel, the Award of Honor, was won by the 316th Tactical Airlift Group. The Award of Merit was won by the 314th Tactical Airlift Wing and the 63d Military Airlift Wing. Awards of Commendation went to the 71st Aerospace Rescue and Recovery Squadron; the 9th Aeromedical Evacuation Squadron; the 1st and 7th Weather Wings; the 3d, 12th, 15th and 30th Weather Squadrons; and the 603d Military Airlift Support Squadron. Additionally, 195 other MAC units will receive National Safety Council President's Award Letters. Congratulations to all.

☆ U.S. GOVERNMENT PRINTING OFFICE: 197-665-120/3

MAC re-introduces "seat-of-the-pants" flying

Thanks to Capt John Ciraifici, 436 MAW, DOVER, for this photo of Capt Joe Chaney demonstrating new techniques.